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Total Cross Section Measurements and Velocity Distributions of Hyperthermal Charge Transfer in Xe^{2+}+ N_2[1] MICHAEL HAUSE, Boston College Institute of Scientific Research, BENJAMIN PRINCE, RAYMOND BEMISH, Air Force Research Laboratory — Guided-ion beam measurements of the charge exchange (CEX) cross section for Xe^{2+}+ N_2 are reported for collision energies ranging from 0.3 to 100 eV in the center-of-mass frame. Measured total XS decrease from 69.5±0.3 Angstroms[2] (Angs.) at the lowest collision energies to 40 Angs.[2]at 100 eV. The product N_2^+ CEX cross section is similar to the total CEX cross section while those of the dissociative product, N^+, are less than 1Angs.[2] for collision energies above 9 eV. The product N_2^+CEX cross section measured here are much larger than the total optical emission-excitation cross sections for the N_2^+ (A) and (B) state products determined previously in the chemiluminescence study of Prince and Chiu suggesting that most of the N_2^+ products are in the X state. Time-of-flight (TOF) spectra of both the Xe^+ and N_2^+ products suggest two different CEX product channels. The first leaves highly-vibrationally excited N_2^+ products with forward scattered Xe^+ (LAB frame) and releases between 0.35 to 0.6 eV translational energy for collisions below 17.6 eV. The second component decreases with collisional energy and leaves backscattered Xe^+ and low-vibrational states of N_2^+. At collision energies above 17.6 eV, only charge exchange involving minimal momentum exchange remains in the TOF spectra.

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Michael Hause
Boston College Institute of Scientific Research

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